

11-1 Arithmetic Sequences

sequence--list of numbers in a particular order

numbers--terms

arithmetic sequence--sequence in which each term after the first is found by adding a constant to the previous term

constant--common difference (d)

ex:

18, 38, 58, 78, 98, ...

$$d = 20$$

$$a_1 = 18$$

$$a_2 = 38$$

$$a_3 = 58$$

$$a_6 = 118$$

Recursive--find a term using the previous term

$$a_n = a_{n-1} + d$$

$$a_6 = a_5 + d$$

Explicit--find a specific term using the first term

ex:

11, 15, 19, 23, 27

$$a_1 = 11$$

$$a_2 = 15$$

$$d = 4$$

$$a_2 = 11 + 4$$

$$a_3 = 11 + 4 \cdot 2$$

$$a_4 = 11 + 4 \cdot 3$$

$$a_5 = 11 + 4 \cdot 4$$

$$a_6 = 11 + 4 \cdot 5$$

$$a_n = a_1 + (n-1)d$$

$$a_{90} = 4(90) + 7$$

$$a_n = 11 + 4(n-1)$$

$$a_n = 11 + 4n - 4$$

$$a_n = 4n + 7$$

Explicit formula
n is an integer

$$a_n = a_1 + (n-1)d$$

ex:

12, 5, -2, -9

Find a_n

$$a_n = a_1 + (n-1)d$$

$$= 12 + (n-1)(-7)$$

$$a_n = 19 - 7n$$

ex:

 $a_1 = 23$ $d = -5$ Find a_n Find $a_5 = 3$ Find $a_{21} = -77$

$$a_n = a_1 + (n-1)d$$

$$= 23 + (n-1)(-5)$$

$$a_n = 28 - 5n$$

$$28 - 5(5)$$

Do:

1. Find a_n

-3, -10, -17, -24, ...

$$a_n = 4 - 7n$$

2. 3, 11, 19, ...

Find $a_{31} = 243$

3. 100, 98, 96, ...

Find $a_{25} = 92$

Arithmetic Mean(s)--term(s) between any two terms in a sequence

ex:

12, 18, 24, 30, 36

18 is the arithmetic mean between 12 and 2424, 30 are the arithmetic means between 18 and 36

ex:

Find 3 arithmetic means between 13 and 29

$$13, \underline{17}, \underline{21}, \underline{25}, 29$$

$$a_1 \qquad \qquad \qquad a_5$$

$$a_5 = a_1 + (5-1)d$$

$$29 = 13 + 4d$$

$$4 = d$$

Do:

Find 2 arithmetic means between 6 and 27

$$27 = 6 + 3d$$

$$13, 20$$

ex:

$$a_1 = \underline{-8}$$

$$a_4 = 16 \quad 16 = a_1 + 3 \cdot 8$$

$$a_7 = 40$$

$$a_n = a_1 + (n-1)d$$

$$a_7 = a_4 + (7-4)d$$

$$40 = 16 + 3d$$

$$8 = d$$

Do:

$$a_1 = \underline{-50}$$

$$a_6 = 5$$

$$a_9 = 38$$

$$d = 11$$

$$5 = a_1 + (6-1)d$$

What term is 731?

$$a_n = 731$$

$$n = \underline{72}$$

$$731 = -50 + (n-1)11$$

HW

p581

15-39odd